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ON THE PRESERVATION OF THE HEALTH OF BODY AND MIND.

BIBLIOTHECA · BODLEIANA ·

BY

FORBES WINSLOW,

MEMBER OF THE ROYAL COLLEGE OF SURGEONS OF LONDON;
AUTHOR OF "THE ANATOMY OF SUICIDE," ETC.

LONDON:
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TO

SIR JAMES CLARK, BART., M.D., F.R.S.

PHYSICIAN IN ORDINARY TO THE QUEEN,

AND TO THE PRINCE ALBERT,

&c. &c. &c.

DEAR SIR,

I FEEL much honoured by your kind permission to bring out this little work under your distinguished auspices.

I cannot do so without availing myself of this opportunity of expressing the high opinion which I entertain of your pre-eminent scholastic, literary, and medical acquirements.

In all subjects connected with the preservation of the public health, and the prevention of disease, I know you take a deep interest.

A work, therefore, which professes, however humbly, to develop *principles* in connection with these important topics, could not be more appropriately dedicated than to yourself.

That you may long live to enjoy the exalted and well-merited honours conferred upon you (with the unanimous approval of your professional brethren) by our Most Gracious Sovereign, is the

Sincere wish, dear Sir, of your humble

And obedient Servant,

FORBES WINSLOW.

45, *Guildford Street, Russell Square.*
1842.

PREFACE.

ALL questions connected with the preservation of health have been already so fully and ably discussed, that it requires, on the part of a new candidate for public favour, the exercise of no little ingenuity in order to impart to such investigations the character either of novelty or of interest.

It has not been the object of the Author to lay down for the guidance of the general Reader, any specific instructions for the treatment of particular affections.

The principles which he has endeavoured to develop in connexion with the subject of health, have a reference to a most important, but much neglected, department of Medicine, *viz.* the prevention of diseases.

In proportion as the public are made acquainted with the causes of Disease, and the general principles of Pathology, will the amount of human suffering be diminished. On this subject, the Author cannot resist the opportunity of referring to some observations to be found in a pamphlet recently published by Sir James Clark, Bart. That able Physician justly remarks, that, "Were the public better informed respecting the causes and progress of diseases, they would know that one half of the diseases with which mankind are afflicted might be prevented by common prudence; and that when diseases make their attack, they might generally be deprived of half their violence by a knowledge of, and attention to, their premonitory signs and first symptoms. This is the only kind of medical knowledge useful to the public. Teach them how they may preserve their health; make them acquainted with the causes of diseases, and the best means of preventing them; and teach them to know the first symptoms of disease, in order that they may apply for medical advice when it is of most avail,—and they will possess all the medical knowledge which they can make good use of. I notice this subject here, because I believe that a sound reform of medical education would tend powerfully to bring about so desirable a state of things. All sound medical knowledge must proceed from the profession in the first instance; and until medical men are instructed in that hitherto most neglected part of medical education, HYGIENE, the public can have no correct views of the means of preserving health, and preventing disease."*

On the subject of Insanity, the Author may speak with confidence, having devoted the greater portion of his professional life to the patient study of this malady in all its varied phases.

With the view of enlarging his knowledge on this important branch of practical Medicine, the Author, independently of the opportunities he has had in his own private practice, has visited with assiduity the Institutions (both public and private) set apart for the treatment of mental diseases.

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* Remarks on Medical Reform, in a Letter to the Right Hon. Sir J. Graham, Bart., by Sir J. Clark, Bart., M.D., F.R.S., &c. &c.

Many of the facts embodied in the chapter referred to are the result of his own observation.

With respect to the treatment of Insanity, complicated with the disposition to commit suicide, the Author's remarks are mainly the result of his own experience. Since the publication of his work on Suicide, he has had frequent opportunities of testing the practical efficacy of the remedies which he has recommended for the cure of this singular mental infirmity. The Reader, therefore, may confidently rely upon the suggestions laid down in this work for the treatment of suicidal mania.

The Author cannot too often impress upon the attention of his readers, the paramount importance of investigating the morbid manifestations of the mind, with the view of preventing, by an early detection of the premonitory symptoms of Insanity, the full development of the disease. He also feels assured, that were institutions established for the reception and treatment of Insanity in its incipient stage, much benefit would accrue to society generally.

The Author hopes that the views which he has propounded on the subject, may have the effect of opening the eyes of his professional brethren to the necessity of having recourse to remedial measures in the first onset of mental derangement.*

45, *Guildford Street, Russell Square.*
1842.

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* Several of the chapters which compose this work were published some time back in the 'Polytechnic Journal.'

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ON THE

PRESERVATION OF HEALTH.

CHAPTER I.

ON COLD.

COLD is but a negation of heat. It is an expression used relatively, in order to express a degree of temperature. It was for some time a matter of dispute whether cold had a positive and independent existence distinct from what we consider its opposite. Natural philosophers appear now generally to concur in the opinion that heat and cold are not the names of things essentially different, but are only degrees of the same property. When a body is heated, expansion takes place, there is an addition of bulk communicated; but as the substance, the temperature of which has been elevated, cools, it contracts,—thus clearly establishing that cold is the absence of caloric, and that it is but a negative quality.

Like heat, cold was supposed to be capable of radiation, and this fact led many to believe that cold was a property *sui generis*. The apparatus used for showing the radiation of heat, consists of two concave mirrors, placed at some distance, but directly opposite each other. If a heated ball, piece of metal, or a canister of boiling water, be placed in the focus of one mirror, and a thermometer at the other, the thermometer will instantly rise several degrees. If burning charcoal be placed in one focus, and a combustible body in the other, the latter will be set on fire, even at the distance of thirty feet. This fact demonstrates the radiation of heat. If, however, instead of placing in the focus a heated body, a piece of ice be substituted in its place, the thermometer placed at the opposite mirror immediately falls; but, as Dr Arnott observes, "The thermometer happens then to be the hotter body in one focus of the mirrors, placed in relation with a colder body, the ice in the other, and consequently, by the law of equal diffusion, it must share its heat with the ice, and will fall. The mirrors in any case have merely the effect, by preventing the spreading and dissipation of the radiant heat from either focus, except towards the other, of making two distant bodies act upon each other, as if they were very near." *

The production of animal heat is one of the essential conditions of life: by its means an equality of temperature in the body is produced in all climates. Were this not the case, the blood of those who inhabit the northern regions would soon become congealed. Animal heat is generally supposed to be developed in the lungs and all the extreme vessels during the combination of the oxygen of the air with the carbon of the venous blood. *Cæteris paribus*, the quantity of heat generated will be in proportion to the integrity with which the respiratory functions are performed, and the size and vigour of the lungs. In this way we account for persons predisposed to consumption, who have imperfectly developed or diseased lungs, complaining of habitual coldness of the surface of the body and the feet. Persons exposed to the influence of intense cold, require enormous quantities of stimulating animal food. If the supply of nutriment be insufficient, the blood becomes impoverished, and the production of animal heat in the lungs is sensibly impaired, and the ability to resist the operation of a low temperature is greatly lessened.

In order to estimate the degrees of heat and cold, various thermometers have been constructed. Those in common use are Reaumur's and Fahrenheit's; the former is considered a standard in France, and the latter an authority in England. According to Fahrenheit, mercury boils at 600°, and freezes at 39°. Reaumur's thermometer is divided into 80 parts, and Fahrenheit's into 180°. In the latter, the freezing point, instead of being *zero*, is called 32°, the maker having counted from the lowest heat which he met in Iceland, or 32° below the freezing of his scale. 9° of Fahrenheit are equal to 5° of the centigrade (a simple thermometer divided into 100 equal parts), and to 4° of Reaumur. To turn the degrees of any one of these thermometers into degrees of any other, we must multiply by 9, and divide by 4 or 5, or the reverse, and by adding or subtracting the 32° of Fahrenheit, we have, as the result, the degree desired. Temperatures below that of freezing mercury are usually measured by alcohol—a liquid which has not yet been frozen.

We have many interesting illustrations of the fact, that although heat is generally considered to expand bodies, cold also has the same effect under certain circumstances. Water, in the act of freezing, has been known to rend rocks and burst very thick shells of metal. A computation of the force of freezing water has been made by the Florentine Academicians, from the bursting of a very strong brass globe, or shell, by freezing water in it; when, from the known thickness and tenacity of the metal, it was found that the expansive power of a spherule of water, only one inch in diameter, was sufficient to overcome a resistance of more than 27,000 pounds, or thirteen tons and a half. Experiments have also been made on bursting thick iron bomb-shells, by freezing water in them, by Mr Edward Williams, of the Royal Artillery, and published in the 'Ed. Phil. Trans.' This fact was brought forward as a powerful argument by those who considered that cold was a positive substance. Since, however, Dr Black's discovery of latent heat, the phenomenon just referred to admits of a satisfactory solution. In the act of congelation, water is not cooled more than it was before, but rather grows warmer; and that as much heat is discharged, and passes from a latent to a sensible state, as, had it been applied to water in its fluid state, would have heated it to 135°. In this process, the expansion is occasioned by a great number of minute bubbles suddenly produced. Formerly these were supposed to be cold in the abstract, and to be so subtle, that, insinuating themselves into the substances of the fluid, they augmented its bulk at the same time that, by impeding the motion of its particles upon each other, they changed it from a fluid to a solid. But Dr Black has shown that there is only air extricated during the congelation; and to the extrication of this air he ascribes the prodigious expansive force exerted by freezing water. It is supposed that the heat which is discharged from the freezing water, combines with the air in its unelastic state, and, by restoring its elasticity, gives it that extraordinary force, as is seen also in the case of air suddenly extricated in the explosion of gunpowder.

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* 'Elements of Physics.'

Cold has a marked effect upon the sensibility. In this respect how extraordinary is the difference beween the native of Germany and of the southern provinces of France? Travellers assert that there are in the neighbourhood of the Poles natives so little endowed with sensibility, that they feel no pain from the deepest wounds. The inhabitants of the coast of North America, if we may believe the testimony of Dixon and Vancouver, thrust into the soles of their feet sharp nails and pieces of glass, without feeling the slightest uneasiness. On the contrary, the slightest prick from a thorn, for instance, in the foot of the strongest African is frequently followed by convulsions and locked-jaw. The impression of the air is alone sufficient to originate the same disease in the negro children in the colonies, the greater number of whom, according to Richerand, die of locked-jaw a few days after birth. Montesquieu, in alluding to this difference of sensibility in the southern and northern nations, says of the latter, that "if you would tickle, you must flay them."

This philosopher has borrowed from the father of physic one of his most brilliant and paradoxical opinions. In his conception, warm climates are the seat of despotism, and the cold the seat of liberty. This error is completely refuted in the profound and philosophical work of Volney on Egypt and Syria. He shows that what Montesquieu has said of cold climates, applies to mountainous regions, while a champaign is more favourable to the establishment of tyranny. Hippocrates has said of the Asiatics, that their being less warlike than the Europeans depended on the difference of climate, and likewise on the despotic form of government. The author of the 'Seasons' maintains that great crimes are almost always committed in winter. The death of King Charles, the assassination of Paul of Russia, and the martyrdom of Louis of France, all of which occurred in winter, seem to lend to that opinion the appearance of truth; but we must consider those unfortunate events as relating to the origin, course, and successive march of conspiracies and revolutionary times.

Some persons are more susceptible of cold than others. This difference is dependent on a constitutional defect in the power of generating animal heat. Captain Ross remarked, during his late expedition, that the power of resisting a low temperature was very different among the members of his crew. It was always easy, he observes, after a little practice, to predict who would suffer from degrees of cold which others would despise. He attributes this to the variable power of the calorific function in different individuals. Admitting the physiological correctness of this view, we can easily believe that one person might sink and perish much more rapidly birch and swamp, they both declared they could go no further. Sir Joseph had again recourse to entreaty and expostulation, but without effect. When Richmond was told that if he did not go on, he would in a short time be frozen to death, he replied that he desired nothing but to lie down and die. Dr Solander was not so obstinate, but expressed a wish to go on, if they would first allow him to take some sleep, although he had before observed, that to sleep was to perish. Sir Joseph Banks and the rest of the party found it impossible to carry them, and they were consequently suffered to sit down, being partly supported by the bushes, and in a few minutes they fell into a profound sleep. Soon after, some of the people, who had been sent forward, returned with the welcome intelligence that a fire had been kindled about a quarter of a mile farther on the way. An attempt was made, which happily succeeded, to rouse Dr Solander, and although he had not slept five minutes, he had almost lost the use of his limbs, and the soft parts were so shrunk that his shoes fell from his feet. He consented to go forward with such assistance as could be given him, but no attempts to relieve Richmond were successful; he, with another black left with him, died. Several others began to lose their sensibility, having been exposed to the cold near an hour and a half, but the fire recovered them.

The celebrated traveller, Dr Edward Daniel Clarke, the late eloquent Professor of Mineralogy in the University of Cambridge, was, on one occasion, near losing his life by cold. Having performed divine service at a church near Cambridge in the afternoon of a very severe, cold, snowy Sunday, in the year 1818 or 1819, he mounted his horse for the purpose of returning home. Soon finding himself becoming very cold and sleepy, and knowing well the danger of giving way to sleep, he put the horse into a fast trot, hoping by that means to arouse himself from the alarming torpor which was coming over him : this means was unavailing ; and then fearing that he should fall from his seat, he dismounted, and determining to make every effort to resist sleep, put the bridle under his arm and walked as rapidly as he could. This, however, did not long succeed ; the bridle dropt from his arm, his legs began to falter, and he was just sinking down upon the snow, to rise no more, when a gentleman, who knew him, came up to him in a gig, and rescued him from his perilous situation.

Drowsiness does not always follow exposure to great cold. Dr Currie gives an interesting account of the shipwreck of an American vessel on the coast of Ireland, by which the greater part of the crew, fourteen in all, were left for twenty-three hours in a great measure under water, the temperature of which did not exceed 33° or 34° of Fahr., and he states expressly that none of these men were drowsy, and that in no one of the three that perished was death preceded by sleep.

The most frightful picture of the dreadful effects of cold recorded is that drawn by M. Beaupré, in his sketch of Buonaparte's memorable Russian campaign. The reader will have a notion of the dreadful mortality which prevailed, when we state that in June, 1812,* Napoleon entered Russia with an army 400,000 strong, and in the middle of December only 30,000 men repassed the Niemen! This tremendous sacrifice of human life was not altogether to be attributed to the effects of cold; the army encountered many other severe privations. The health of the soldiers was affected by the fatigues of the march, atmospherical variations, and by the excessive heat by day (at the commencement of the campaign), and sharp coolness by night. The water which they drank, and with which they prepared their food, was often drawn from swamps, marshes, or rivulets at the bottom of ravines, where were putrifying carcases of men and horses; independently of this, there was a scarcity of provisions and clothing, and the army suffered from great mental depression; but the principal cause of mortality was the intense cold to which the soldiers were exposed during the winter months. The order for retreat from the ruins of Moscow was given on the 15th of October, and it was not until then that the cold became truly sensible. It was the intention of Buonaparte to establish his winter quarters at Smolensko. The army was but three days' march from this city, when the heavens became black, and the snow began to fall in great flakes; the cold was then felt with extreme severity; disbanded regiments were reduced almost to nothing, by loss of men left every moment on the roads or in the bivouacks. Influenced by the flattering and illusory reports circulated by Buonaparte with reference to the abundance of provisions which he said the army would find at Smolensko, the soldiers pushed forward, and travelled without discipline, night and day; ultimately they were obliged to stop, and thousands perished in the woods, ditches, and at the bottom of ravines. "I have seen them," says M. Beaupré, "sad, pale, despairing, without arms or caps, staggering, scarce able to sustain themselves, their heads hanging to the right and left, their extremities contracted, setting their feet on the coals, laying down on hot cinders, or falling into the fire, which they sought mechanically, as if by instinct. Along the road were seen, in the ditches and fields, human carcases heaped up and laying at random in fives, tens, fifteens, and twenties, of such as had perished during the night, which was always more murderous than the day."

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* The winter of 1812 is regarded in Russia as one of the most rigorous on record; it was intensely felt even in the most southern parts of Russia. The great and little bustard, which during the winter season quit the plain and come annually for protection from the cold into the southern part of that peninsula, towards the coasts, remained benumbed on the snow, and great quantities of them were caught.

Dr Le Beaupré has detailed the circumstances to which he owes the preservation of his life. During the frightful night that the army left Smolensko, he felt much harassed; towards five o'clock in the morning, he was compelled to stop to rest. He observes, "I sat down on the trunk of a birch, beside eight frozen corpses, and soon experienced an inclination to sleep, to which I yielded the more willingly, as it then seemed delicious. I was fortunately dragged out of that incipient somnolency, which would infallibly have brought on torpor, by the cries and oaths of two soldiers opposite, who were striking violently a poor exhausted horse that had fallen down. I emerged from that state with a sort of shock. The sight of what was beside me recalled strongly to my mind the danger to which I exposed myself. I took a little brandy, and set to running to remove the numbness from my legs, whose coldness and insensibility were such as if they had been immersed in an ice bath."

Cold, when very intense, is known to act on the frame so briskly as to depress and destroy vitality with astonishing rapidity. Beaupré states, that he saw soldiers expiring instantaneously from excessive cold, as if thunderstruck. At Smolensko the temperature was so rigorous, that more than thirty grenadiers of the Italian guard fell frozen as they attempted to set themselves in line on the heights beyond Borysthenes. A battalion of the regiment to which Beaupré belonged, when encamped on the same height, lost in this manner many men in a single day.

In Chili there prevails, during certain seasons of the year, a wind so impetuous and cold, that men and animals exposed to its influence are, as it were, petrified. In this way, by acting on the nervous system and destroying the irritability of the heart, cold may often produce sudden death. A higher degree of cold can be borne when the atmosphere is at rest. The reason of this must be obvious. "With the thermometer," says Captain Parry, "at 87° below the freezing point (a fearful degree of cold), and no wind stirring, the hands may remain uncovered for ten minutes or a quarter of an hour without inconvenience, while with a fresh breeze, and the thermometer nearly as high as zero, few people can keep themselves exposed so long without considerable pain." Animal substances are often preserved by extreme and continued cold from decomposition. Bomare affirms, that there are still found in South America a considerable number of the first conquerors of the new world, who, at the commencement of the sixteenth century, preferred, to a long and circuitous route, the short but dangerous passage of the mountains of Peru, in order to examine the rich mines which had been described to them. The warmth of their avarice, and their ardour in the search of gold, could not defend them from the influence of cold, from which they perished, and by which they are still preserved, with all that they carried with them, and in the various attitudes in which they were frozen and surprised by death, constituting a sort of natural mummies.*

Bartholin observes, that the Danish sailors had informed him, that frozen bodies had been preserved in Spitzbergen for a period of 30 years.†

Fish and other cold-blooded animals will survive an intense torpidity. "The fish froze," says Captain Franklin, "as fast as they were taken out of the nets, and in a short time became a solid mass of ice, and by a blow or two of the hatchet were easily split open, when the intestines might be removed in one lump. If in this completely frozen state they were thawed before the fire, they recovered their animation." Captain Franklin has seen a carp recover so far as to leap about with great vigour, after it had been frozen for 36 hours.‡

Isaak Walton quotes Gesner for the fact of some large breams being put into a pond, which was frozen the next winter into one mass of ice, so that not one could be found. In the spring they were all swimming about again when the pond thawed. "A thing almost as incredible," says the sentimental sinner, as Lord Byron calls him, "as the resurrection of an atheist."

M. Prunelle has sent marmots stupified, from Savoy to Paris, packed up like minerals, and has afterwards brought them to life by the application of stimuli.‖

In Russia, fish stiff as sticks by cold, have been transported in this condition to great distances. After plunging them in cold water life has been restored. Eels motionless and frozen, but not therefore lifeless, are often brought to the Russian markets. In the north, many persons have been found asphyxiated, and apparently dead for many days, who have been restored to life. Beaupré observes, "How many resurrections might have been made on the retreat from Moscow!"

Barnard Valentin mentions having seen a cat, which, being frozen with cold, and trampled on as dead, was buried in a dung-hill, and in two days after life was restored.

In the *Bibliotheca Britannica* a case is recorded of a woman who, having wandered amid the snows, was seized and benumbed with cold.

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* Dict. d' Hist. Nat.

† Gazette de Salut.

‡ Journal to the Polar Sea,—p. 48.

‖ Annales du Museum d'Histoire Naturelle.

The unfortunate woman was completely embedded in the snow for eight days and nights, at the end of which time, the end of a coloured handkerchief appearing above the snow, led to her being discovered; she emerged from the gulf, and took food with eagerness. The peculiarity of this case is, that after the first numbness, she found herself very well beneath her snow covering; she felt neither cold nor hunger, but only thirst, which she appeased with morsels of snow.

An interesting account is before the public of the case of Elizabeth Woodcock, who was involved in a snow drift, on Feb. 2, 1799, in her way home from market, where it is supposed she drank too freely of spiritous liquors. The snow accumulated over her to the height of about six feet, a sort of hollow cone being left from her head to the surface, through which she was enabled to breathe. From this situation she was extricated on the 10th of February, having lain eight days in the snow. Her life was preserved; but the greater part of her feet was destroyed. A snow storm has often providentially preserved the lives of many who have been exposed to the action of cold in mountainous districts.* Snow is a bad conductor of heat, and in this way it acts in protecting the roots and seeds, and tender plants, during the severity of winter. When the green blade of wheat and the beautiful snow-drop flower appear in spring rising through the melting snow, they have recently owed an important shelter to their winter mantle. Under deep snow, while the thermometer in the air is far below zero, the temperature of the ground rarely remains below the freezing point. The Laplander, who, during his long winter, lives underground, is glad to have additionally over head a thick covering of snow. Among the hills of the west and north of Britain, during the storms of winter, a house or covering of snow frequently preserves the lives of travellers, and even of whole flocks of sheep, when the keen north wind, catching them unprotected, would soon stretch them lifeless along the earth.†

Owing to the heat generated in the bowels of the earth, the most intense frosts do not penetrate more than a few inches into it. The water in pipes, buried a few feet in the earth, is seldom frozen. Springs never freeze; when the ground is covered for months with snow, and all the ponds and lakes are frozen, the water which issues from the bowels of the earth remains at its source unaffected. Spring-water is always of the same temperature, and in summer it is considered cold and refreshing only because the atmosphere which surrounds it is warmer.

Artificial cold is produced in various ways. Saltpetre, sal-ammoniac, and many other salts, if mixed with water, greatly increase its coldness. An intense cold may be produced by mixing, in a phial, corrosive sublimate and sal-ammoniac finely pulverized, a pound of each, and pouring on the mixture a pint and a half of distilled vinegar, shaking the whole well together. M. Homberg, who first tried this experiment, asserts that this composition became so cold as scarcely to be held in his hand; and that it even froze while he was making the experiment. A much greater degree of cold may be excited by using snow, or rather powdered ice, instead of fluid water. A mixture of common salt and snow will sink the thermometer to 0°; with potash and pounded ice it will sink to about 8°. Evaporation has great influence in reducing the temperature of bodies, the conversion of water into vapour being necessarily accompanied with the absorption of much caloric. In India, ice is made by placing the water to be frozen in flat unglazed earthen vessels, which are exposed during the night; they are placed upon the worst conductors that can be procured, such as sugar canes, dried stems of maize, &c. The dryness of the air causes a very considerable evaporation, and the consequent reduction of temperature is such, that a thin film of ice is formed towards the morning, though the temperature of the air may have been all the time above the freezing point. The quantity of ice obtained is greater when the weather is warm and dry than when it is moist, though in the latter case the temperature of the air may have been actually lower.

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* With respect to suspended animation from cold, it is said by J. Chr. Fabricius, that men have sometimes been blocked up in the mountains of Liffland, and have hibernated for months, without injury; and by Gangin, that in some countries man is a regularly hibernating animal, and that there is a people of Muscovy who die every year on the 27th of November, and are not restored to life until the 24th of April following!—' Vide 'Fletcher's Physiology,' vol. ii. p. 149.

† Dr Arnott.

In India, wine is cooled for the table by surrounding the bottle with a composition of salt and nitre.

But the most remarkable experiments, with reference to artificial cold, were made by Mr Walker of Oxford. He poured spirit of nitre on Glauber's salts, and he found the effect to be similar to that of the same spirit poured on ice and snow; the addition of sal-ammoniac rendered the cold still more intense. The proportions of these ingredients, recommended by Mr Walker, are concentrated nitrous acid, two parts by weight, water one part. Take of this mixture, cooled to the temperature of the atmosphere, eighteen ounces, of Glauber's salt a pound and a half avoirdupois, and of sal-ammoniac twelve ounces. On adding the Glauber's salt to the nitrous acid, the thermometer fell 52°, viz. from 50° to —2; and on the addition of the sal-ammoniac, to — 9°. Thus Mr Walker was able to freeze quicksilver without ice or snow, when the thermometer stood at 45°; viz., by putting the ingredients in four different pans, and enclosing them within each other.

It has been maintained that the morbid effects of intense cold are dependent not so much upon the degree of lowness of temperature, or even the degree to which the body is actually cooled, as on the rapidity of the change, and on the intensity of the sensation excited. Chossat found that the temperature to which animals killed by cold had been reduced before they died, was considerably various, and always higher as the reduction of temperature had been more rapid, and therefore more injurious.

It is a question with physiologists whether the brain or circulation is first affected by extreme cold. That stupor and delirium often result from exposure to a low temperature there cannot be a doubt; but these effects are, perhaps, owing to the sedative influence of the cold on the capillary circulation, and the blood being driven from the surface of the body to the internal organs and large vessels. But even in those cases where the brain appears to be more especially implicated, the action of the heart is enfeebled and the circulation depressed.

Sir Benjamin Brodie classifies the effects of cold in the following order:—

1. It lessens the irritability, and impairs the functions of the whole nervous system.

2. It impairs the contractile power of the muscles.

3. It causes contraction of the capillaries, and thus lessens the circulation, and stops the cutaneous secretion.

4. It probably destroys the principle of vitality in every part, and does not exclusively disturb the functions of any particular organs.

It may be urged in objection to the last proposition that many circumstances concur in inducing us to believe that the brain is the organ that appears principally to be affected in the chain of morbid causation. In many cases, before torpor has been induced, the intellect has been so confused that the individual is to all appearances in a state of intoxication. Captain Parry, in his journal, relates the case of a man who was exposed for nearly a whole night to the influence of extreme cold. When he was brought on board the vessel and spoken to he looked wild, spoke thick and indistinctly, and it was impossible to obtain from him a rational answer to any question that was put to him. He had every symptom of a man who had been drinking too freely. On this subject Captain Parry observes, "To those who have been much accustomed to cold countries this effect will not appear singular, but I cannot help remarking that many a man may have been punished for intoxication, who was only suffering from the benumbing effects of frost; for I have more than once seen our people in a state so exactly resembling intoxication, that I certainly should have charged them with that offence, had I not been quite sure that no possible means was afforded them on Melville Island to procure anything stronger than snow-water."

The mortality among the old, infirm, infants and children, is very great during the cold winter seasons. It has been affirmed that more than one half of the deaths, and two thirds of the diseases, that occur among the children of the poor, are more or less caused by exposure to a low temperature. How few there are who have a just conception of the intense sufferings of the poor during the inclement season of the year! In this "wilderness of brick and mortar," how many are doomed to perish from the want of means to protect them from the morbid effects of cold. Independently of their insufficient clothing and want of fuel, the poor are peculiarly rendered susceptible of the action of cold, in consequence of their being deprived of proper nourishment. The man who lives well and fares sumptuously every day, can bear for a long period with impunity the influence of severe cold, because animal heat is generated in large quantities; but the poor man has a three-fold evil to contend with, viz. want of clothing, fire, and food.

Many facts combine to show us the utility of animal diet in protecting us from the agency of cold. In countries near the poles, nature has provided such articles of food best calculated to nourish, stimulate, and impart vitality to the frame, and thus enable it to bear up against the rigour of the seasons and the injurious influence of the climate. Dr Aiken states that the Russians, who winter in Nova Zembla, imitate the Samoiedes, and eat raw flesh and drink the blood of the reindeer, in order to preserve their health in these arctic regions. The Greenlander devours, with apparent relish, the raw flesh of the whale, or the half-frozen and putrid flesh of seals, and drinks the blood of these latter animals, or regales on dry fish and whale oil.

In cold climates the appetite is vigorous, and animal food is indispensable; in hot climates, and during the summer in temperate regions, the desire for food is not so urgent, and a light vegetable diet is preferred.

Warm-blooded animals are continually eating; birds, whose temperature is the highest, are doing so incessantly, if they can obtain food. Cold-blooded animals eat little, or seldom.

The inhabitants of cold countries never travel without covering themselves with furs from head to foot. If seized with cold, they rub the benumbed part with snow before entering their houses; they never travel without tea, coffee, some spirituous liquors, and even food, in order to avoid suffering from hunger, which they consider very dangerous.

hot, but *when cooling, after having been heated;* when a profuse general perspiration was rapidly carrying off the heat, or when fatigue had exhausted the vigour of the system, and the power of cooling heat; and that, on the contrary, where the sensation of heat was great and steady, the heat itself retained, or kept up by exertion, and the living power not debilitated by fatigue, the application of cold was safe and salutary.

It must be evident, from the previous statement, that cold may safely be applied to the body when heated, provided the temperature be kept up by exertion, and while the power of generating animal heat remains in the constitution. The popular practice of waiting till a degree of coolness has taken place before quitting a hot room, or before going into a cold bath, is dangerous in the extreme. It is questionable whether any person ever received an injury from cold, after leaving a heated assembly, if he left while he continued warm, and either by exercise in the air, or by a warm covering, kept up that warmth in some degree until he arrived at home. On the same principle, delicate and infirm persons, before going into a cold bath, are recommended to use such a degree of exercise before immersion as may produce some increase of heat, and thus secure a degree of reaction under the shock. Dr Currie observes that those who, being heated and beginning to perspire, wait on the edge of the bath or water-side until they are perfectly cooled, as hundreds are in the habit of doing, and then plunge in, often feel a sudden chillness and shivering of an alarming and dangerous character.

In cases where injurious consequences follow the introduction of cold liquids into the stomach when the body is heated, the remedies are warm diluents, with ammonia, camphor, opium, cordial diaphoretics, friction of the limbs and surface generally with stimulating embrocations, hot fomentations, sinapisms, and cataplasms of Cayenne pepper to the epigastrium, and especially animal warmth applied to the surface, &c.

Sudden exposure from cold to heat cannot be borne with impunity. In many cases the most disastrous results follow the exposure of frozen parts to the influence of heat. "Woe to the man," says Baron Larry, in his description of Bonaparte's Russian campaign, "benumbed with cold, whose animal functions were nearly annihilated, and whose external sensibility especially was extinct, if he suddenly entered too warm a chamber, or approached too close to the large fires of the bivouac. The more prominent parts, benumbed and frozen, and at a distance from the centre of circulation, were struck with gangrene, which supervened on the instant, and developed itself with such rapidity, that its progress was sensible to the eye, or the individual was instantly suffocated by a kind of turgescence. Individuals were often seen to fall stiff dead into the fires of the bivouac; and every one who approached near enough to heat his frozen limbs, was struck with gangrene wherever the cold had destroyed the vital principle."

Such injurious effects are easily prevented. All external warmth should be carefully avoided until the sensibility and circulation have been somewhat restored by friction with substances little, if at all, elevated beyond the temperature of the parts themselves. Snow is the best application that can be made under these circumstances.

Larry considers that the benefits which result from the application of snow in these cases, consist in the pure oxygen it contains, and the caloric developed by the friction being absorbed by the blood contained in the capillary vessels. The circulation is thus restored, and the course of it is kept up by the subsequent application of spiritous and camphorated tonics, by the internal use of cordials gradually administered, dry and hot frictions over the whole surface of the body, and continued moderate exercise. In case of a deficiency of ice and snow in the first instance, Larry recommends the employment of cold red wine or vinegar, or camphorated brandy, made cold by plunging it into the water of a well.

Cold water, impregnated with salt, appears to have a less injurious effect upon the system than fresh water of a low temperature. Salt water is supposed to stimulate the vessels of the skin, and thus to prevent the debilitating action of cold. Persons shipwrecked during the winter have a better chance of surviving by immersing the body for the greater part in the water (for the sea is then warmer than the wind, and there is no evaporation from the skin) than if they were to remain motionless out of the water. Sailors and fishermen are very healthy, and declare that they never catch cold from getting wet with sea-water. Capt. Bligh, in alluding to the stimulating effects of sea-water, says in his narrative, "As I saw no prospect of getting our clothes dried, I recommended every one to strip and wring them through salt water, by which means they received a warmth that, while wet with rain-water, they could not have, and we were less liable to suffer from colds or rheumatic complaints."

Cold is a valuable therapeutical agent. It has remarkably sedative and tonic properties. In some fevers and inflammations it is of essential service in allaying the inordinate action of the vascular system. At one time the application of cold to parts in a state of inflammation was supposed to act beneficially, by diminishing the morbid degree of heat generated; but improved pathological science has established that such is not the case. In local inflammations, cold evaporative lotions are applied with great benefit; and in inflammation of the brain, cold applied to the scalp has a sedative influence on the blood-vessels, and thus lessens the flow of blood to the part affected. Cold has a great effect in controlling febrile action: Hippocrates notices this fact. In all cases of fever, when the temperature of the body is above 98°, when there is no sense of chilliness, and when there is no general or proper perspiration, the free use of cold drink, and the affusion of cold water over the skin, are the most salutary remedies that can be adopted. Cold very often produces great muscular relaxation. In some cases of dislocations, where the muscular contraction is great, and an impediment is thus thrown in the way of the reduction, the patient is often placed in a cold bath, after which the limb is easily restored to its natural situation.

The tonic properties of cold are pointed out when speaking of the effect of cold bathing.

It was at one time supposed that cold water was a specific for the plague. M. Desgenettes, physician to the French army in Egypt, relates that a miner, attacked by the plague during the expedition into Syria, escaped naked, during a violent delirium, from the fort of Calhielh, and wandered nearly three weeks in the desert. Two swellings, which he had upon him at the time, suppurated and healed of themselves: this man perfectly recovered. An artilleryman also escaped from the lazaretto of Boulak on the day he was admitted, and in a paroxysm of a violent delirium precipitated himself into the Nile. He was taken out about half an hour afterwards, and perfectly recovered. On this subject Dr Currie observes, "How fruitless and how perverted are the efforts by which learning and science have attempted to come at this fatal disease! The best remedies for the plague were probably missed by the physicians both of France and England; they were not to be traced in the prevailing systems of medicine, or in the pharmacy of our shops; but it is probable they might have been found in the refreshment of the breeze, in the dews of the night, and in the waters of the Nile."

Cold also acts as a stimulant. In certain convulsive diseases, accompanied by great torpor, the affusion of cold water on the naked body will often rouse the dormant sensibility. Cold affusion is also of essential service in cases of asphyxia brought on by the fumes of charcoal. Dogs suffocated in the vapours of the *Grotto del Cano* are recovered by plunging them in the adjoining lakes. In cases of poisoning by opium and prussic acid, cold affusion is a most valuable remedy.

The climate of a country is mainly dependent on its temperature. The mildness of the European climate, contrasted with that of Asia and America, is very marked; this circumstance is said to arise from the general prevalence of westerly winds, which are elevated in temperature in consequence of passing over a mass of water, which even in the month of January, under the mean parallels of 45 or 50 degrees, does not fall below 48° and 52° of Fahr. The northern boundaries of Asia and America extend to the winter limit of the polar ice. Unobstructed by any chain of mountains, the north winds blow with unmitigated fury over icy plains, extending northward to the pole, and eastward to the point of maximum cold, which, according to Humboldt and others, is situated near the meridian of Behring's Straits. The refrigerating effects of these winds, says Dr Copeland, are not counterbalanced by burning deserts on the southern side of these continents; or, as respects Asia, by any great extent of land flood below the equator; consequently the Asiatic countries situate in the temperate zone, more especially, are not warmed by ascending currents of heated air, such as those which arise from the deserts of Africa, and are so beneficial to Europe. The position of the great mountain chains of Asia, and the elevation of the country, also contribute to diminish the temperature, they presenting a barrier to the warm winds from the equatorial regions. Elevated places and groups of lofty mountains accumulate, and preserve the snow till late in the summer, and give rise to descending currents of air, which cool the circumjacent countries. Asia, moreover, in the whole extent of Europe, has no sea on its western side; consequently the west, or predominating winds, are, for the greater part of this quarter, land winds, and their severity is increased by the great enlargement of the land towards the north. These circumstances occasion remarkable differences in the climates of Asia and the western countries of Europe.

Invalids who are suffering from diseases which are aggravated by the cold, find the best winter residence in this country to be during the months of November, December, January, February, and March, on the south coast, Undercliff in the Isle of Wight, Hastings, and Brighton.

CHAPTER II.

THE PHYSIOLOGY OF DEATH.*

> ——— " A gaunt form, pale
> But regal, swathed in robes of lustrous white
> That took no shadow in their folds; his brow
> Was circled with a silver coronet,
> Which had a ghastly radiance, and was set
> With rims of stars, orb-sockets, blank and rayless."
> (*From an unpublished Tragedy, by I. Westland Marston, Esq.*)

> " Nihil est in morte quod metuamus, si nihil timendum vita commisit."

THE love of life is one of our strongest instincts. We are accustomed to look upon death with a superstitious horror, and to attach to the last inevitable moment the most gloomy and terrible associations. It is in vain that we attempt to dismiss from our mind the fact that there is a time appointed for all to die. The most sceptical philosophers have never had the boldness to question the uncertainty of life. A thousand circumstances are constantly reminding us of the frail tenure by which we hold our existence. We have no occasion to visit the sombre chamber of death, to witness the last struggle of expiring nature, or to receive the parting embrace and admonition of a near and dear relative, in order to be made conscious that the grim King of Terrors is no ideal creation of the "heat-oppressed brain." It is unnecessary that we should have daily crossing our path the melancholy funeral procession winding its way through the streets of the metropolis, followed by those paying the last tribute of affection and respect to a departed spirit, to be convinced that this frail tenement which we now inhabit, and which is endowed with life, health, and spirits, must, ere long, crumble into dust. Universal nature has clothes," or "fumbling of the sheets," as Dame Quickly terms it, has been noticed from the earliest times. The peculiar cadaverous odour of the corpse has been perceptible for some hours before death. Dr Elliotson states that patients have recovered even after this exhalation has been developed.* The voice becomes shriller than natural; sometimes the action of the heart ceases gradually. This happens when the patient has laboured under a protracted disease. In some cases the heart, before finally ceasing to beat, contracts with great violence, and then suddenly stops. The "death rattle," which is often so distressing to those near the bed of a dying person, is caused by the ejection of air from the lungs through the fluid in the trachea, or wind-pipe. The respiration is often extremely laborious, and this has been termed by Laennec, "the catarrh of the dying." As the blood is not propelled to the extremities, animal heat is not evolved, and the feet become cold, the fingers pinched and livid.

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* It is computed by Dr Casper, that there are on the earth 960.000,000 human beings, and that the average deaths are 29 000,000 annually, 80,000 daily, nearly 3,700 hourly, and 55 every minute. The greater number of deaths occur after midnight, or the first in the morning. In Great Britain, 18,200 die annually; in European Turkey, 33,000; in Greece and Italy, 33,000; in the Low Countries, 26,500; in France, 26,600; in Prussia, Austria, Switzerland, Portugal, Spain, 25,000; in Denmark, Poland, Germany, Flanders, European Russia, 22,000; in Sweden and Norway, 21,300.

The above are generally the signs of approaching death. The indications of actual death are equally varied. It will be impossible, within the limits of this paper, to enter even upon the confines of those important and interesting points connected with the indications of actual death; it is my purpose merely to enumerate the main signs, and to leave the consideration of the particulars for some future occasion. This subject is important, not only physiologically, but practically, as being connected with the questions of premature interment, trance, &c.

The signs of actual death are generally considered to be, cessation of the heart's action and pulsation, stoppage of respiration, absence of animal heat, rigidity of the muscles, coagulation of the blood, and putrefaction of the body. No one of the above signs can be relied upon if taken by itself; it is only when they are viewed collectively that they are important. In many cases the heart, to all appearance, has ceased to beat, and death has not resulted; the same may be said with reference to the respiration. The ordinary mode of testing the presence of death, by holding a mirror to the mouth, or by light downy bodies being placed near the mouth and nostrils, is very fallacious. An almost total absence of animal heat is often noticed in hysterical affections, tetanus, and cholera, as well as in death. Rigidity of the muscles is not always an indication of death; it generally lasts for twenty or thirty hours, and often for seven or eight days; it commences in the head and trunk, and afterwards in the extremities. This phenomenon is considered to depend upon a lingering vital contraction, and to be the last effort of life; but this position is untenable. It is important to distinguish the rigidity caused by disease and that which follows death. The rigid muscular spasm caused by disease is preceded by the loss of heat; in death the reverse takes place. The contraction of the muscular fibres in death may be overcome by force. In some affections of the head and spine a peculiar rigidity is produced, which may be confounded with the cadaverous rigidity. M. Marc relates the case a gentleman who went to the theatre in apparently good health, and after the representation was over, was found by his friends sitting in the front of his box with his head resting upon his hands, and his elbows on the ledge; he had died of apoplexy, and had been retained in that position by the tonic spasm of the muscles.

In violent deaths the blood remains in a fluid state. Putrefaction is said to be an invariable sign of death. Winslow, the celebrated Danish anatomist, who paid much attention to the uncertain signs of death, in consequence, it is said, of his having been buried alive and then restored to life, pronounces it "unicum signum;" other physicians maintain the contrary.

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* This phenomenon must be the result of incipient putrefaction. Haller maintains that it may commence in a living person; he relates of one Vandenhoeck, his bookseller, that when lying in the last state of malignant fever, he prophesied his approaching death, and that he grounded his prediction on his sense of smell.

In many cases the countenance of the dead assumes an almost heavenly appearance. Although a few minutes previously, when in the act of dying, the muscles of the face have been violently distorted, a very short period after the last struggle the expression has been truly angelic. The immortal poet has unfolded with exquisite effect this phenomenon. In Romeo's lamentation over the fate of Juliet he exclaims—

> "O my love! my wife!
> Death, that hath suck'd the honey of thy breath,
> Hath had no power at all upon thy beauty;
> Thou art not conquered; beauty's ensign yet
> Is crimson in thy lips, and in thy cheeks,
> And death's pale flag is not advanced there."

The 'Bard of Hope,' in alluding to the same placid appearance of the countenance, says—

> "Hush'd were his Gertrude's lips! but still their bland
> And beautiful expression seem'd to melt
> With love that could not die."

It has often been my painful duty, in the discharge of my professional obligations, to witness the last fearful contest between life and death. The sight is often not the most pleasing one to contemplate. At the moment of death the mind occasionally becomes most brilliant in its conceptions. Every faculty appears to be endowed with increased energy. Visions of the past float before the imagination—old associations are revived. The mind appears to revisit the scenes of boyhood. The names of old acquaintances, the companions of youth, rush on the memory, and the dying man is often seen to hold sweet converse with friends and relations long since dead and gone. Occasionally the mind appears to be distressed at the sight of some imaginary object. I once heard a dying person complain of not being able to die. A young man whom I attended some years back, and whose case was hopeless, said to me one day, on visiting him, "Oh, I wish to die, but cannot do so." I asked him the reason of it, and he replied that he could not die, as there were some pigeons' feathers in the bed. I endeavoured to prove to him the absurdity of the notion, but in vain. He remained in a dying state for some days. One afternoon he implored his mother to place him in a chair by the fire, as he wished to die, but never should unless his bed were changed. He was accordingly removed from the bed to the chair. He had not sat down for a minute before he expired. His life was not prolonged, as his friends supposed, by his being in the vicinity of pigeons' feathers. It is well known that towards the termination of many diseases the slightest change in the position of the patient often produces instantaneous death. A person may lie on his back for some days in a dying state, and if the nurse attempted to lift the patient out of bed, or even to raise him in bed, the exertion necessary to accomplish this will often bring about a fatal issue. In the case just referred to the man died in consequence of the sudden exhaustion caused by removing him from his bed to the chair.

The delirium of the dying has a close resemblance to the phenomena of dreaming. Outward objects appear to excite in the mind peculiar trains of thought not necessarily connected with the circumstances which called them into existence.